

## Project Summary

BBC Laboratories, Inc. is an environmental microbiology laboratory established in Tempe, AZ in 1991. The laboratory works with commercial and industrial clients in soil, compost and remediation microbiology projects. The facility is staffed with professional microbiologists having expertise in a variety of areas including the enhancement of bacterial and fungal growth through nutritional selection.

BBC Laboratories, Inc. has been retained by Rexius Forest By-Products, Inc. to quantify and benchmark many of the known erosion control properties of compost. For some time the benefits of compost have been known but little research has been done to document the causes of these benefits. The goals of this research are to identify and increase the beneficial microorganisms for erosion control and ultimately increase the erosion control effectiveness of compost.

Compost contains many important attributes for the management of erosion problems. The organic matter in the compost is critical in areas where topsoil has been removed and revegetation is necessary. The organic matter also serves as a substrate for the growth of microbial populations that assist in building soil structure, which will naturally be more resistant to erosion. This soil structure development is achieved by a combination of events. The bacteria in the compost produce viscous and gummy substances that adhere soil particles together while the fungal and actinomycete filamentous network serves as a rebar-like framework on which the soil particles can adhere. Together, they form a porous soil structure that can assist in water retention and soil aeration. This soil structure is also appropriate for good plant root development, which is ultimately critical in soil erosion prevention.

Compost is an ideal carrier for other components that might further enhance erosion control, such as naturally tacky or sticky compounds. Additionally, by adding compounds that will enhance the growth of the cohesive and filamentous microorganisms, compost can be fortified to optimally prevent erosion and to assist in breaking down some of the oils, petroleum hydrocarbons and other environmentally hazardous materials that can be by-products of roadside runoff.

This project was designed to investigate various compost supplements that might enrich the targeted structure-building microbial populations of the compost and increase the overall cohesiveness of the compost. The project design incorporated different phases. The first phase examined individual compost supplements and how they impacted the targeted microbial populations.

Phase two incorporated the best features of phase one in multiple supplement strategies to develop the optimal product. The striking difference that some of the product combinations caused in this portion of the study were the increases in the actinomycete and petroleum hydrocarbon degrading bacteria concentrations over the levels found in the control. In one treatment combination, Rexius "Microblend™", the actinomycete concentrations were 56 times higher than the control while the petroleum hydrocarbon degrader concentrations were over 16,000 times higher than the control. Other treatment combinations also had significant increases in these two groups of microorganisms.

The actinomycetes are filamentous bacteria, which help to bind soil particles and stabilize soils. Although they are smaller in diameter than filamentous fungi, the actinomycetes can provide an important contribution to the physical stability of soil. The increase in petroleum hydrocarbon degraders should be important in assisting with the degradation of hazardous run-off from petroleum products that build up on the roadways.

Phase three will commence on 1/7/02 and will continue to focus on refining and improving the existing supplement package while simultaneously seeking out new beneficial materials.